

# Exhibit 1



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/849,571	05/20/2004	Weidong Zhu	266923-000007USPT	6579
76601 7590 03/08/2011 NIXON PEABODY, LLP 300 S. Riverside Plaza, 16th Floor CHICAGO, IL 60606-6613				
EXAMINER				
NGHIEM, MICHAEL P				
ART UNIT		PAPER NUMBER		
2857				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/849,571

**Applicant(s)**

ZHU ET AL.

**Examiner**

MICHAEL P. NGHIEM

**Art Unit**

2857

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 September 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 47, 49, 56-60 and 62-65 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 59 and 62-65 is/are allowed.
- 6) ☒ Claim(s) 47, 49, 56-58 and 60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2010 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The Amendment filed on September 9, 2010 has been considered.

#### ***Notice of Defective Appeal Brief and Notice of Appeal***

The notice of appeal filed on September 10, 2010 and the appeal brief filed on December 10, 2010 are defective because they were not timely filed. Applicant filed an amendment on September 9, 2010 as a reply to the non-final Office action mailed on March 9, 2010, and the examiner has not issue an Office action in response to the reply. Applicant may file a notice of appeal and appeal brief only if the application is under a rejection. Applicant could have filed the notice of appeal and appeal brief if he or she didn't file the reply to the non-final or wait until the examiner sends out another rejection.

#### ***Terminal Disclaimer***

The terminal disclaimer filed on September 9, 2010 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of any patent granted on US Application 12/153,348 has been reviewed and is accepted. The terminal disclaimer has been recorded.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 47, 49, and 60 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 47, 49, and 60, why is that when the “number of the stiffness parameters being larger than a number of system equations”, “the system equations are severely underdetermined”? The system equations being severely underdetermined is not understood.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 47, 49, and 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The “number of stiffness

parameters is larger than a number of system equations such that the system equations are severely underdetermined” is not described in the original disclosure.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stubbs.

Regarding claim 56, Stubbs discloses a system for determining stiffness parameters of a structure (Fig. 5), comprising:

a structure (structure, Abstract, line 1; specimen 42);

a random impact device (impact hammer, column 5, line 51) for introducing vibrations in said structure (column 5, lines 50-53),

an impact applicator (impact hammer has steel tip, Google search, page 1, paragraph 2) such that the force (40) and arrival times of said impact applicator at said structure (42) are random (column 5, lines 50-53);

such that the force (40) and arrival times of said impact applicator at said structure (42) are random (column 5, lines 50-53);

a sensor (claim 1, line 4) arranged to measure vibrations of said structure (claim 1, lines 4-5) and output vibration information (measured first signal, claim 1, lines 4-5);  
and

a stiffness parameter unit for receiving said vibration information (column 1, lines 56-58; column 25, lines 31-34; 104, Fig. 5), determining natural frequency data of said structure (column 5, lines 8-9; column 7, lines 17-21; Table 14), and determining the stiffness parameters of said structure using said natural frequency data (using equation 1, column 5, which expresses the relationship between natural frequencies and stiffness parameter).

However, Stubbs does not disclose the following claimed features:

- Regarding claim 56, said random impact device comprising a random signal generating unit for generating first and second outputs; a random impact actuator for receiving said first and second outputs; and an impact applicator coupled to said random impact actuator, wherein said random impact actuator drives said impact applicator.
- Regarding claim 57, said random impact actuator drives said impact applicator in accordance with said first and second outputs.
- Regarding claim 58, the first and second outputs comprise independent random variables.

Nevertheless, Stubbs discloses that the random impact device is a PCB board (PCB 086B01, column 5, line 51). It would be obvious to electrically actuate the PCB impact device with electric signals since the device is an electrical device.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide the impact device of Stubbs with electrically actuation means for the purpose of generating a force for inciting vibrations on a structure. Control of the impact device would be improved if the device is electrically actuated.

***Allowable Subject Matter***

Claims 59 and 62-65 are allowed.

***Reasons For Allowance***

The following is an examiner's statement of reasons for allowance:

The **combination** as claimed wherein a system comprising the first and second outputs determine the force and arrival times, respectively, of the impact applicator at said structure (claims 59, 62) is not disclosed, suggested, or made obvious by the prior art of record.



Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

Applicant's arguments filed on September 9, 2010 have been fully considered but they are not persuasive.

With respect to the 35 USC 112, 2<sup>nd</sup> paragraph, rejections of claims 47, 49, and 60, Applicants argue that "for a linear system having  $m$  equations and  $n$  unknowns, the system is "underdetermined" if  $n > m$  (and is "overdetermined" if  $m > n$ ). Severely underdetermined system of linear equations include systems wherein  $n \gg m$  (i.e., far more unknowns than equations, where  $n$  represents unknowns and  $m$  represents equations)". Applicants further argue that "Applicant's specification cites, with reference to an example of an aluminum beam test specimen (see FIG. 12), the '*severely underdetermined system equations* (5 equations with 80 unknowns).' (emphasis added). In this example, the number of unknown significantly exceeds the number of equations".

Examiner's position is that the claims do not recite the number of unknowns are more than the number of equations. Instead, the claims recite "the number of stiffness parameters being larger than a number of system equations" (see claim 47, lines 11-12). The stiffness parameters have been determined by the iterative processing unit (see claim 47, lines 8-10). Thus, the stiffness parameters are known. Thus, it is unclear why the systems equations are severely underdetermined when a number of known/determined parameters is larger than a number of system equations.

With respect to the 35 USC 112, 1<sup>st</sup> paragraph, rejection, Applicants argue that "Applicant's specification discloses, *inter alia*, damage detection using changes of natural frequencies '[f]or structures such as beams and lightning masts in electric substations, using only the changes in the natural frequencies can relatively accurately detect the location(s) and extent of damage, even though the system equations are *severely underdetermined* in each iteration' (§§ [0181]-[0182])(emphasis added) and discusses an example of an aluminum beam test specimen (see FIG. 12) with "*severely underdetermined system equations* (5 equations with 80 unknowns)." (§ [0188])(emphasis added)".

Examiner's position is that the claims recite "the number of stiffness parameters being larger than a number of system equations" (see claim 47, lines 11-12). The stiffness parameters have been determined by the iterative processing unit (see claim 47, lines 8-10). Thus, the stiffness parameters are known. On the other hand, paragraphs [0181],

[0182], and [0188] of the original disclosure do not disclose comparing the system equations with the known parameters. Instead, paragraph [0188], e.g., describes comparing the system equations with the “m” unknowns (paragraph [0188], lines 22-24). Thus, the claimed limitation of “severely underdetermined systems equations when a number of known/determined parameters is larger than a number of system equations” is not described in the original disclosure in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants further argue that “[t]he claim amendments in question were introduced in the Supplemental Amendment filed on December 29, 2008, and did particularly point out where the originally filed disclosure supported the amendments. Accordingly, the Examiner has failed to discharge his burden and has further failed to set forth any factual findings supporting the conclusory allegation of lack of written description. *See, e.g., Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000)(the written description “inquiry is a factual one and must be assessed on a case-by-case basis”).

Examiner's position is that Examiner responded to the Supplemental Amendment on April 24, 2009 with factual findings supporting the conclusory allegation of lack of written description: “Examiner's position is that paragraphs [0130] and [0188] describe comparing the system equations with the “m” unknowns (see paragraphs 0130, lines

20-25; paragraph 0188, lines 22-24). However, paragraphs [0130] and [0188] do not disclose comparing the system equations with the known stiff parameters (e.g.,  $G_i^{**}(0)$ , paragraph 0130, line 27)" (see Office Action, filed on April 24, 2009, page 10, paragraph 2). The claims indicate that the stiff parameters are known (e.g. claim 47, lines 8-10).

With respect to the 35 USC 103 rejections, Applicants argue that "Stubbs has not been shown to disclose or suggest a random impact device comprising (1) a random signal generating unit for generating first and second outputs, (2) a random impact actuator for receiving said first and second outputs, and (3) an impact applicator coupled to said random impact actuator, wherein (4) said random impact actuator drives said impact applicator such that force and arrival times of said impact applicator at said structure are random. The entirety of the Examiner's assertion of 'obviousness' is that an impact hammer is disclosed in Stubbs and that it can receive an electrical signal. As further acknowledged by the Examiner, Stubbs also fails to disclose that the random impact actuator drives the impact applicator in accordance with the first and second outputs from the random signal generating unit (claim 57). As further acknowledged by the Examiner, Stubbs also fails to disclose that, further to claim 57, 'the first and second outputs comprise independent random variables.' To all of these limitations, the Examiner cites to Stubbs 'impact hammer' (col. 5, line 51) and apparent ability to receive an electrical signal".

Examiner's position is that while the meaning of claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as reasonably allowed. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Stubbs discloses a random impact device (impact hammer, column 5, lines 50-52). Since the impact device an electric device (PCB 086B01, column 5, line 51), it would be obvious to provide the impact device with (1) a random signal generating unit for generating first and second outputs since it is obvious to provide a power supply for generating a power output and a return power output to the impact device to supply power to (2) a random impact actuator (body of the impact device; power signals are supplied to the body of impact device). Stubbs discloses that specimen (42) receives a physical force (40) from the impact device (column 5, lines 50-51). Thus, it would be obvious to provide the impact device with (3) an impact applicator (portion of impact device that exerts force (40) ) coupled to said random impact actuator for providing optimum support (the body can provide optimum support for elements coupled to it). Stubbs discloses that the random device operates within a range of frequencies (column 5, lines 50-53; column 6, lines 31-35) and by variations of the input force and duration of excitation applied to the structure (column 6, 57-60). Thus, it would be

obvious that (4) said random impact actuator drives said impact applicator such that force and arrival times of said impact applicator at said structure are random. Accordingly, regarding claim 57, it would be obvious that the random impact actuator drives the impact applicator in accordance with the first and second outputs from the random signal generating unit (the impact device drives the impact applicator based on the power signal and the power return signal, as discussed above). Furthermore, regarding claim 58, in light of the discussions above with respect to force and frequency, it would be obvious that the first and second outputs comprise independent random variables since it is obvious to change the frequency and amplitude of the power signals to the impact device for the purpose of varying the force and frequency of the impact device.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Nghiem whose telephone number is (571) 272-2277. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Michael P. Nghiem/

Primary Examiner, GAU 2863

March 3, 2011